Physical Review Letters 2015 vol.114 N24

# Mutual Independence of Critical Temperature and Superfluid Density under Pressure in Optimally Electron-Doped Superconducting LaFeAsO1-xFx

Prando G., Hartmann T., Schottenhamel W., Guguchia Z., Sanna S., Ahn F., Nekrasov I., Blum C., Wolter A., Wurmehl S., Khasanov R., Eremin I., Büchner B.
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

## Abstract

© 2015 American Physical Society. The superconducting properties of LaFeAsO1-xFx under conditions of optimal electron doping are investigated upon the application of external pressure up to ~ 23 kbar. Measurements of muon-spin spectroscopy and dc magnetometry evidence a clear mutual independence between the critical temperature Tc and the low-temperature saturation value for the ratio ns/m∗ (superfluid density over effective band mass of Cooper pairs). Remarkably, a dramatic increase of ~ 30% is reported for ns/m∗ at the maximum pressure value while Tc is substantially unaffected in the whole accessed experimental window. We argue and demonstrate that the explanation for the observed results must take the effect of nonmagnetic impurities on multiband superconductivity into account. In particular, the unique possibility to modify the ratio between intraband and interband scattering rates by acting on structural parameters while keeping the amount of chemical disorder constant is a striking result of our proposed model.

http://dx.doi.org/10.1103/PhysRevLett.114.247004